5/21/18

"Coming together is a beginning, keeping together is progress, working together is success." -Henry Ford

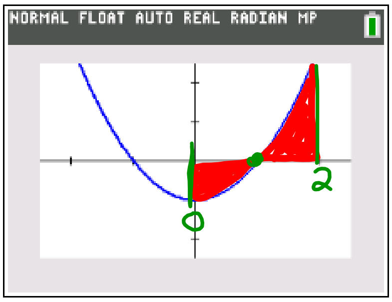
HW: Test 2 on Wednesday 5/23

AIM: Review for Test 2

Topics:

- Area Between Curves
- Length of an Arc

1. Find the area between $f(x) = x^2 - 1$ and the x-axis on the interval [0,2]



(*) where do the graph of x^2-1 and x-axis cross?

$$x^2-1=0$$

$$(x+1)(x-1)=0$$

$x=-1$ $\quad$ $x=1$

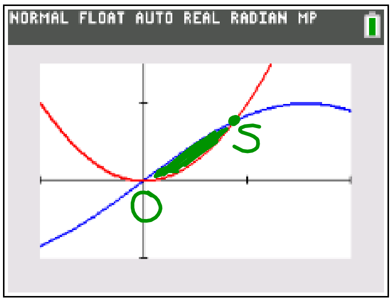
↑ in the interval [0,2]

$$\text{Area} = \int_0^1 \left(0-(x^2-1)\right)dx + \int_1^2 (x^2-1-0)\,dx$$

$$= \frac{2}{3} + \frac{4}{3} = \boxed{2 \text{ units}^2}$$

2. Find the area bound by $f(x)=\sin x$ and $g(x)=x^2$

Top bottom



$$\text{Area} = \int_0^S \left(\sin(x) - x^2\right) dx$$

NORMAL FLOAT AUTO REAL RADIAN MP

Ans→S

.8767262154

$\int_0^S (\sin(X)-X^2)dX$

.1356975072

$$\text{Area} = \boxed{.136 \text{ units}^2}$$

3. Find the length of the curve given by the function $y = 2x^{3/2} - 1$ on the interval $[0,1]$.

$$\text{Length} = \int_a^b \sqrt{1 + (y')^2}\, dx$$

$$y = 2x^{3/2} - 1$$

$$y' = 3x^{\frac{1}{2}}$$

$$\text{Length} = \int_0^1 \sqrt{1 + \left(3x^{1/2}\right)^2}\, dx$$

NORMAL FLOAT AUTO REAL RADIAN MP

$$\int_0^1 \left(\sqrt{1+(3X^{.5})^2}\right) dX$$

2.268353822

$$\text{Length} = \boxed{2.268 \text{ units}}$$

4. What is the length of $g(x) = x^{3/2}$ on the interval $[0,1]$?

$$g'(x) = \frac{3}{2}x^{\frac{1}{2}}$$

$$\text{Length} = \int_0^1 \sqrt{1 + \left(\frac{3}{2}x^{\frac{1}{2}}\right)^2}\, dx$$

NORMAL FLOAT AUTO REAL RADIAN MP

$$\int_0^1 \left(\sqrt{1+\left(\frac{3}{2}X^{.5}\right)^2}\right)dX$$

1.439709873

$$\text{Length} = \boxed{1.440 \text{ units}}$$

5. Find the length of $y = \frac{2}{3}(x^2+1)^{3/2}$ from $x = 1$ to $x = 4$.

$y' = 1(x^2+1)^{\frac{1}{2}} \cdot (2x)$

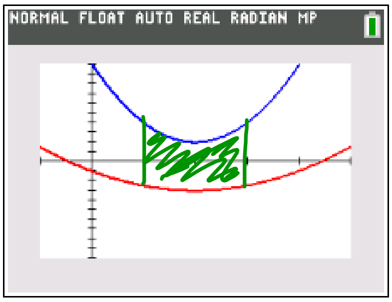
$y' = 2x(x^2+1)^{\frac{1}{2}}$

$$\text{Length} = \int_1^4 \sqrt{1+\left(2x(x^2+1)^{\frac{1}{2}}\right)^2}\,dx$$

$$= \boxed{45 \text{ units}}$$

Top Bottom

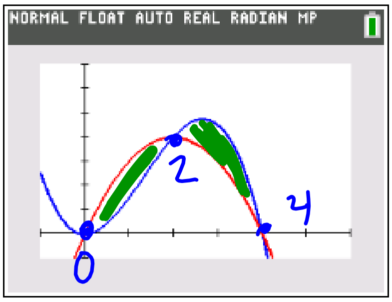
6. What is the area between $f(x) = 2x^2 - 8x + 10$ and $g(x) = \frac{1}{2}x^2 - 2x - 1$ on the interval [1,3].



$$\text{Area} = \int_1^3 \left(2x^2 - 8x + 10 - \left(\tfrac{1}{2}x^2 - 2x - 1\right)\right) dx$$

$$= \boxed{11 \text{ units}^2}$$

7. Find the area bounded by $y=\frac{-x^3}{2}+2x^2$ and $y=-x^2+4x$.



$$2\left(\frac{-x^3}{2}+2x^2 = -x^2+4x\right)$$

$$-x^3+4x^2=-2x^2+8x$$

$$0 = x^3-6x^2+8x$$

$$0 = x(x^2-6x+8)$$

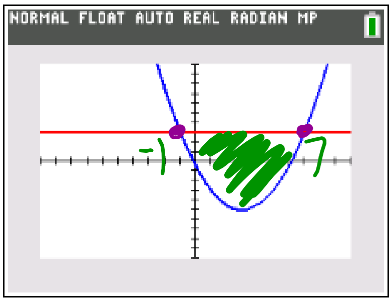
$$0 = x(x-2)(x-4)$$

$$x=0,\ 2,\ 4$$

$$\text{Area} = \int_0^2 \left(-x^2+4x-\left(\frac{-x^3}{2}+2x^2\right)\right)dx + \int_2^4 \left(\frac{-x^3}{2}+2x^2-\left(-x^2+4x\right)\right)dx$$

$$= \boxed{4 \text{ units}^2}$$

8. What is the area bounded by $f(x)=\frac{x^2}{2}-3x-\frac{1}{2}$ and $g(x)=3$?



$2\left(\frac{x^2}{2}-3x-\frac{1}{2}=3\right)$

$x^2-6x-1=6$

$x^2-6x-7=0$

$(x-7)(x+1)=0$

$x=7 \quad x=-1$

$$\text{Area}=\int_{-1}^{7}\left(3-\left(\frac{x^2}{2}-3x-\frac{1}{2}\right)\right)dx$$

$$\text{Area}=\boxed{\frac{128}{3}\text{ units}^2}$$